

PSYCHE.

THE SCALES OF COLEOPTERA.

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(Continued from page 11.)

SCALES OF HOPLIA.

A few only of the scales from the upper side of this insect are colorless, and, as these seem to be undeveloped or immature, I tried no experiments upon them.

The scales of the under side of *H. coerulæa* are purple, purplish red, red, bluish and colorless by transmitted light, and by reflected light they are silvery white with a tendency to metallic green in places. The scales of the tip of the abdomen, altho really dorsal in position, are covered with spines, are mostly reddish or purple by transmitted light, and are metallic green by reflected light. Some of the scales of the legs are like those from the rest of the under surface of the insect; others of them are lanceolate (fig. 3, c), and colorless or milk-white, but covered with longer spines or hairs than the more circular forms of scales. The hairs of this insect have fine branches, as do the hairs of all *scarabacidae*, according to Fischer and according to my own observations.

Water, alcohol, chloroform and similar reagents render the scales of the under side colorless and transparent, the colors returning as soon as the scales are dried.

In finer structure the scales of the under side are different from those of the upper side in being clothed with the before-mentioned spines or fine hairs, and in the absence of the fine internal network, which is here replaced in some scales by a more irregular internal marking of like nature.

The scales of *Hoplia modesta*, from this country, are confined to the tip of the abdomen and to the under side of the insect. They are all gray or milk-white by transmitted light, and silvery by reflected light. They are narrower than those from corresponding parts of *H. coerulæa*, but are otherwise alike in structure and need no further mention here.

SCALES OF POLYPHYLLA.

The whitish spots upon the elytra of *Polyphylla variolosa* are produced by lanceolate scales, the opaque whiteness of which is caused by the large amount of air contained in them. As they present no characters of special interest not to be found in scales of other coleoptera described in this paper I have not drawn them or further studied them.

SCALES OF *VALGUS SQUAMIGER*.

Nearly every part of *V. squamiger* is covered with scales which are of two colors, an opaque dark brown and a semi-opaque white. The scales are somewhat rolled and are very brittle, so that when they are pressed beneath a cover-glass upon the microscope slide they usually split at the edges. The unbroken scales are nearly round, about 0.14 mm. long by 0.08 to 0.12 mm. wide, and until they are deprived of air but little structure is visible. When they are deprived of air they are seen to be covered with dense, rather long hairs, — to be in fact almost



Fig. 4. Scale of *Valgus squamiger*. Enlarged 100 diam.

shaggy. Fig. 4 represents an unbroken scale that has been treated with alcohol to remove the air. The hairs, as will be seen by the figure, are arranged, somewhat roughly, in transverse or oblique lines; but what is more curious, the basal ends of these hairs seem to be connected, in each line, with one another, and finally each of these bands of hairs, which may contain from two to twenty hairs, seems to connect by its basal line with a branch going to the basal end, or stem, of the scale. These branches unite as they approach the basal end of the scale until they form one trunk. These ramifications are delicate brown and are beautiful on a prep-

aration of the scales in Canada balsam. In fig. 4, which was made too small to show them correctly, they are proportionally far too coarse, and are not tapered as regularly as they should be from base to tip.

I have not found this ramified structure in any scales except those of *Valgus*, and in them I have not studied it to any extent. It appears as if the cavity of the scale, once open and probably opening into the large hairs, had closed gradually, leaving channel-like folds between the hairs and from them to the stem of the scale. These channels are apparently entirely closed now, altho I made no sections of these scales to absolutely prove this point.

HAIRS OF *PSILOPTERA*.

The under side of the abdomen and other parts of *Ps. drummondi* are clothed with brownish-yellow hairs, which are set upon a smooth, nearly black surface, and consequently the hairs appear of a light bronze color.



Fig. 5. Hair of *Psiloptera drummondi*. Enlarged 100 diam.

Seen under the microscope these hairs or scales — for they seem to be as much

scales as they are hairs—are sword-shaped (see fig. 5), and of a yellowish color. Their length is from 0.25 mm. to 0.30 mm., their width about 0.01 mm., and they are covered with longitudinal striae, which are usually about 0.001 mm. apart. These hairs or scales are easily seen to contain air by using water or alcohol to drive it out. I introduce them here only to illustrate this somewhat common form of appendage intermediate between scales and hairs. I have found no other squamiform appendages on the limited number of *buprestidae* which I have examined.

No description has been given, as far as I can discover, of scales in *clateridae*, altho the generic names *Chalcolepis* and *Chalcolepidius*, and the specific names of *Adelocera lepidoptera*, *Lacon leprosus*, *Meristhus lepidotus*, *Monocrepidius lepidus*, *Cryptohypnus squamifer*, and others, would imply that the presence of scales had been either suspected or verified. That the scales of *clateridae* are interesting in form and structure can be seen by the following descriptions of scales of *Chalcolepidius*, of *Maus* and of an undetermined species of European *clateridae*.

SCALES OF CHALCOLEPIDIUS.

Nearly the whole surface of *C. rubripennis*, except its elytra, is thickly covered with scales, which give to the parts thus covered a peculiar metallic or bronzed aspect, with colors changing from blue to greenish or reddish.

The scales from all parts of this insect are very much alike, varying little in form (see fig. 6, *a*, *b*, and *c*). They are all of ovate form, more or less elongate, with the larger end toward their shank or stem, which is nearly always broken off in removing them from the insect; they are very flat, scarcely convex above, but do not rest very tightly pressed upon the surface of the insect. Their length is from 0.09 to 0.15 mm., their width from 0.02 to 0.04 mm., and their thickness is about 0.0025 mm.

These scales when removed and examined under the microscope are uniformly brown, except with very obliquely transmitted light, when they are sometimes purplish. If, however, they are put upon a black surface and illumi-

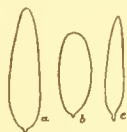


Fig. 6. Different forms of scales from *Chalcolepidius rubripennis*. Enlarged 100 diameters.

nated from above they are brilliant with blue, red and green, the color depending upon the position of the surface of the scale with reference to the light. Put in direct sunlight, on a black surface, and the microscope focussed somewhat above them, the light is decomposed in fine lines of brilliant blue, green and red, as if series of solar spectra were drawn up near each other, thus indicating striation of the scale-surface. The scales have a very slight tendency to longitudinal folding, but no striae, or really distinct

fold, are visible upon them. The shank and a little of the basal portion of the scales are hollow; whether the whole scale is hollow I have not determined.

Treatment with water, alcohol, glycerin or turpentin does not seem to affect the scales of *Chalcolepidius*, which appear to contain no air. They are not bleached by chlorin bleaching reagents.

SCALES OF ALAUS.

The two velvety black spots upon the dorsal surface of the thorax of *A. oculatus*, to which this insect owes its specific name, are formed of scales, as are also all the white portions of the beetle, the ground color of the whole insect being a slightly shining black. The same remarks apply to *A. myops*, the scales of which are like those of *A. oculatus* in every respect.

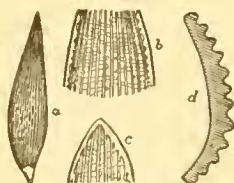


Fig. 7. Scales of *Alaus oculatus*: a, brown scale; b and c, portions of white scales to show cross-bands; d, transverse section of a brown scale. Enlargement: a, 100 diam.; b and c, 300 diam.; d, 500 diam.

The form of all the scales of *A. oculatus* is scaphoid, with the concave side toward the insect. The scales are striate on the convex side, but smooth on the concave side. Fig. 7, a, illustrates their form, the lower end being the one attached to the insect. In some cases

the shank by which the scale is attached is proportionally longer than is shown in the figure. These scales are inserted by their shanks in holes irregularly distributed in the chitinous covering of the insect. The irregular arrangement, peculiar form and striation, and mode of insertion of the scales of *A. oculatus* forcibly remind one of the leaves in a bed of lily-of-the-valley (*Convallaria*) when these leaves are blown toward one direction by a gentle breeze.

The scales of *A. oculatus* are all of about the same size—about 0.20 to 0.23 mm. long by 0.04 to 0.05 mm. wide, and 0.005 mm. in greatest thickness—from whatever part of the insect they are taken. Those which form the two black thoracic spots are deep brown when seen under the microscope, and the others are opake white when dry. The striae of these scales are about 0.0025 mm. apart, and converge somewhat toward each end of the scales. The striae of the white scales are a little less distinct than are those of the dark scales, the whole white scale, to appearance, when viewed with a low-power microscope, being covered with minute cross-lines, so numerous as to give the scale an opake white color. Under higher magnifying power these transverse lines present an appearance as in fig. 7, b and c. The longitudinal striae are above the transverse lines, i. e., on the convex side of the scales, while the cross-lines extend as interrupted, transverse bands across the lower or concave part of the scales. No transverse bands are visible, even after re-

moving the air, in the brown scales. In the white scales the bands usually start out from or beneath the marginal longitudinal stria of the upper side of the scale, and extend beneath the other lon-

gitudinal striae toward the middle of the scale (see fig. 7, *b* and *c*): exceptionally, however, they begin beneath one of the other longitudinal striae.

(*To be continued.*)

HOMINIVOROUS HABITS OF *LUCILIA MACELLARIA*, "THE SCREW-WORM."

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I have from time to time had occasion to note the depredations of the screw-worm upon horses and cattle in this state, but until recently have not received positive evidence of its attacks upon human subjects in any locality so far north as Kansas. But early in September, 1882, I received from Mr. S. D. Osborn, the postmaster at Varch, in Southeastern Kansas, specimens "of the worms which came from the nostrils of Milton Carter." These proved to be the larvae of *Lucilia macellaria* Fab., the so-called "screw-worm." Upon further inquiry I learned that upwards of one hundred full-grown maggots escaped from the nose of this patient, who finally recovered from the serious illness consequent upon their ravages. I also ascertained that Mr. Carter had long been afflicted with an offensive nasal catarrh, which made his nostrils an attractive place for the oviposition of the fly, and that he had fallen asleep in the woods in the daytime only a few days before the first appearance of the symptoms produced by the presence of the larvae.

Several other instances of the attacks of *Lucilia* upon man soon came to my knowledge, most of which led to fatal results. Among these I will select the case attended by Dr. J. B. Britton, of Mapleton, in southeastern Kansas, who reported it in full at the session of the Southeast Kansas District Medical Society, in January, 1883. From this report I condense the following account: "On the evening of August 22d, 1882, Mr. M. E. Hudson complained of a peculiar sensation at the base of the nose and along the orbital processes, which was first followed by inordinate sneezing, and later by a most excruciating pain over the os frontis, also involving the left superior maxillary. This patient also had suffered, and was still suffering, from an aggravated form of nasal catarrh. The discharge was quite purulent, of a yellowish color frequently tinged with blood, with a disagreeable odor and at times intolerably offensive. On the 24th there was a profuse discharge of much purulent matter from the nostril and mouth, when all pain instantly